

PERFORMANCE OF ALUMINIUM ALLOY IN
SEAWATER USING VARIOUS CONCENTRATION
OF TAPIOCA STARCH

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**PERFORMANCES OF ALUMINIUM ALLOY IN SEAWATER USING VARIOUS
CONCENTRATION OF TAPIOCA STARCH**

By

MAISARA BINTI ZAKARYA

**A Thesis Submitted in Partial Fulfilment of
the Requirements for the Degree of
Bachelor of Applied Science (Maritime Technology)**

**DEPARTMENT OF MARITIME TECHNOLOGY
FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
UNIVERSITI MALAYSIA TERENGGANU**

2013



DECLARATION AND VERIFICATION REPORT
FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled: **Performance Of Aluminium Alloy In Seawater Using Various Concentration Of Tapioca Starch** by **Maisara Binti Zakarya**, Matric No. **UK 21435** have been examined and all errors identified have been corrected. This report is submitted to the Department of Maritime Technology as partial fulfillment towards obtaining the **Bachelor Degree of Applied Science (Maritime Technology)**, Faculty of Maritime Studies and Marine Science, Unitversiti Malaysia Terengganu.

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DECLARATION

I hereby declare that this thesis entitled **PERFORMANCE OF ALUMINIUM ALLOY IN SEAWATER USING VARIOUS CONCENTRATION OF TAPIOCA STARCH** is the result of my own research except as cited in the references.

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PERFORMANCE OF ALUMINIUM ALLOY IN SEAWATER USING VARIOUS CONCENTRATION OF TAPIOCA STARCH

ABSTRACT

Currently, there are many studies about the use of inhibitors for the control of corrosion of metals and alloys which are in contact with aggressive environment. It is need to point out the importance of cheap and safe inhibitor of corrosion. Therefore, inhibitors that are from natural sources have become important as they are environmentally acceptable, readily available and renewable sources. Aluminium was chosen as experimental material because it is widely used for many applications in engineering material as it has many advantages. This study used tapioca starch because it offers interesting possibilities for corrosion inhibitor and it is safe to use, low cost, availability, and high solubility in seawater. Low concentration of tapioca starch which is 200, 400, 600, and 800ppm was used. The characterization of the corrosion was performed by using weight loss, potentiodynamic polarization (PP), electrochemical impedance spectroscopy (EIS), fourier transform infrared spectroscopy (FTIR) and scanning electron microscope (SEM). The percentage of inhibition efficiency (IE %) was calculated by using equation and this study showed the corrosion rate decrease by increasing concentration of the tapioca starch. Tapioca starch used is believed to form a surface layer as it protects AA5083 from reacting to the environment. This is confirmed by doing analysis of SEM that show the formation of precipitates of tapioca starch on the metal surface, which reduced the overall corrosion reaction.

PRESTASI ALUMINIUM ALOI DALAM AIR LAUT MENGGUNAKAN PELBAGAI KEPEKATAN KANJI UBI KAYU

ABSTRAK

Pada masa ini, terdapat banyak kajian tentang penggunaan perencat untuk mengawal kakisan logam dan aloi yang berada dalam hubungan dengan persekitaran yang agresif. Ia adalah perlu untuk menunjukkan kepentingan perencat yang murah dan selamat terhadap kakisan. Oleh itu, perencat yang berasal daripada sumber semula jadi adalah penting kerana mereka diterima alam, merupakan sumber-sumber yang sedia ada dan boleh diperbaharui. Aluminium telah dipilih sebagai bahan eksperimen kerana ia digunakan secara meluas untuk banyak aplikasi dalam bahan kejuruteraan kerana ia mempunyai banyak kelebihan. Kajian ini menggunakan kanji ubi kayu kerana ia menawarkan kemungkinan yang menarik untuk perencat kakisan dan ia adalah selamat untuk digunakan, kos rendah, ketersediaan, dan keterlarutan dalam air laut yang tinggi. Kepekatan kanji ubi kayu yang rendah iaitu 200, 400, 600, dan 800ppm telah digunakan. Pencirian kakisan diuji dengan menggunakan kehilangan berat, pengutuban potentidinamik (PP), spektroskopi impedans elektrokimia (EIS), alat Fourier Transform Infrared Spectroscopy (FTIR), dan alat spectroscopy impedance microscope (SEM). Peratusan kecekapan perencatan (IE%) telah dikira dengan menggunakan persamaan dan kajian ini menunjukkan penurunan kadar kakisan dengan peningkatan kepekatan kanji ubi kayu. Kanji ubi kayu yang digunakan dipercayai membentuk lapisan permukaan kerana ia melindungi AA5083 daripada bertindak balas kepada persekitaran. Ini disahkan dengan melakukan analisis SEM yang menunjukkan pembentukan mendakan kanji ubi kayu pada permukaan logam, yang mengurangkan tindak balas kakisan keseluruhan.